

REMARKS

The Applicants request reconsideration of the rejection.

Claims 1-5, and 7-20 are now pending.

The Examiner objected to the Abstract, citing minor informalities set forth on Pages 2-3 of the Office Action. The Abstract has been amended above to address the Examiner's concerns.

Claims 12 and 13 were rejected under 35 U.S.C. 101 as being directed to non-statutory subject matter. The Applicants have adopted the Examiner's kind suggestions to ensure compliance with §101.

Claims 1-13 were rejected under 35 U.S.C. 112, second paragraph, as being indefinite for the reasons set forth on Pages 4-5 of the Office Action. The Applicants have amended the claims to address the Examiner's concerns, noting that conditional expressions are not *per se* indefinite because a method invention can be recited with definite metes and bounds by following each step as recited, even if the negation of a condition results in a subsequently-recited step not being performed.

Claims 1, 7 and 9-13 were rejected under 35 U.S.C. 103(a) as being unpatentable over Chellis et al., U.S. 6,901,446 (Chellis) in view of Cannon et al., U.S. 6,230,247 (Cannon). The Applicants traverse as follows.

According to the managing method as set forth in amended Claim 1, the method is executed by a management computer connected to a computer and to a

storage apparatus through a network. The storage apparatus has plural logical devices.

The method includes a step of allocating a first logical device of predetermined capacity from a storage pool of unallocated logical devices of the storage apparatus to the computer. The method further obtains the capacity utilization of each logical device allocated to the computer, and calculates an estimated future capacity utilization which is estimated from the capacity utilization of each logical device.

According to Claim 1, if the capacity of the allocated first logical device is greater than the estimated future capacity utilization by a determined amount, a second logical device is allocated to the computer from the storage pool. Further, the first logical device is de-allocated (the allocation of the first logical device is "released"), and the first logical device is returned to the storage pool. It is noted that the capacity of the second logical device is required to be less than the capacity of the first logical device, and greater than or equal to the estimated future capacity utilization.

On the other hand, if the capacity of the allocated first logical device is greater than or equal to the estimated future capacity utilization but less than the sum of the estimated future capacity utilization plus the determined amount, the allocation of the first logical device to the computer is retained.

The primary reference to Chellis is directed to a system and method for describing and automatically managing resources. The patent sets forth, in broad

terms, certain embodiments regarding the automatic allocation of resources among consumers. In this regard, although the patent language is sometimes broad enough to be interpreted as being similar to some of the claim recitations, the Applicants respectfully submit that the person of ordinary skill would not be led from the patent disclosure to the claimed invention without having first read the claimed invention and worked backwards towards the broader expression of the patent disclosure. In other words, improper hindsight interpretation and analysis might mislead the person of ordinary skill, but such hindsight interpretation and analysis does not constitute a *prima facie* teaching of the invention.

For example, the Office Action refers to Column 5, lines 1-2 of the patent as allegedly disclosing the claimed step (original claim language) of allocating a storage area of predetermined capacity from the storage area of said storage apparatus to said computer. Column 5, lines 1-2 disclose that "feedback data may indicate that a first user has been allocated 100Mb of space." Thus, although the patent discloses that a user can be allocated a certain capacity of memory, taking the passage out of context dilutes its meaning within the context of the invention disclosed by Chellis.

To illustrate, the Office Action continues by finding the steps of "obtaining the capacity utilization of each storage area allocated to said computer" and "calculating an estimated capacity utilization" in Column 14, lines 34-40 of the patent. Column 14, lines 34-40 disclose that a feedback and monitoring component 120 can be monitoring properties including, but not limited to, actual usage of the resources 25, interaction between the resources 25, allocation status of the resources 25,

maintenance status of the resources 25, load balances between the resources 25 and predicted usage of the resources 25. However, the broad language does not state that the capacity utilization of each storage area allocated to a computer is obtained, but can be interpreted as more generally monitoring the actual usage of all resources, whether storage areas or not, and whether individually monitored or not. In addition, the passage only states that "predicted usage of the resources" can be a monitoring property, and does not teach that the capacity utilization of each storage area is used to calculate an estimated future capacity utilization. The broad "predicted usage" is not limited to the estimated capacity utilization of each storage area, and the passage does not state that the predicted usage is calculated from the capacity utilization of each storage area obtained in the prior step.

Bringing Column 5, lines 1-2 back into context, the passage does not refer back to the allocation of 100Mb to a user, and the person of ordinary skill is not taught by Column 14, lines 34-40 that any of the allocated resources or predicted usage thereof pertains to a storage area of predetermined capacity from the storage area of a storage apparatus connected to the computer as claimed.

To further clarify and distinguish the invention set forth in Claim 1, from Chellis (whether taken individually or in any motivated combination with other references), Claim 1 has been amended to require steps of allocating a first logical device of predetermined capacity from a storage pool of unallocated logical devices of the storage apparatus to the computer; obtaining the capacity utilization of each logical device allocated to the computer; and calculating an estimated future capacity

utilization which is estimated from the capacity utilization of said each logical device. Neither Chellis nor Cannon addresses the allocation of a logical device from a storage pool of unallocated logical devices, or the obtaining and calculation of capacity utilizations of the logical devices allocated to the computer.

The Office Action notes that Chellis does not specifically recite estimating the capacity utilization from the capacity utilization of each storage area allocated to the computer, or the allocation of a storage area greater than the estimated capacity utilization and less than the capacity of the allocated storage area when the capacity of the allocated storage area is greater than the estimated capacity utilization. At the outset, the Applicants note that the latter claim language was not clearly presented in the claim, and has been improved by the above amendments.

Continuing, the Applicants note that the Office Action asserts that Chellis's system "essentially reduces the capacity of that particular allocation by releasing that capacity (the capacity difference between the actual allocation and the estimated utilization) for use in other allocations," citing Column 5, lines 1-17. The Office Action further asserts that the secondary reference to Cannon discloses a similar dynamic storage allocation system in which an estimated capacity utilization is estimated from the capacity utilization of each storage area allocated to a particular computer, and the capacity allocation to a particular storage allocation is decreased when the particular allocation is over-allocated, citing Column 5, lines 53-67, and Column 7, lines 25-45.

Addressing Chellis first, the Applicants note that Column 5, lines 1-17 suggest that once the 100Mb of space has been allocated to a first user that only uses 3Mb of space, a new level of allocation for the resource may be generated based on numerous factors incorporating allocations in addition to the 100Mb allocated to the first user. Based on these additional considerations, including the allocation of other resources (including additional memory) to other users, Chellis may opt to over-allocate the first resource. Of course, this is in opposition to the claim requirement that the allocation of space be reduced, and is also a contrast to the application of Chellis in the rejection itself.

Furthermore, Cannon's lines 53-57 of Column 5 disclose a client profile that contains a running estimate of the associated client station's next data storage transaction. When a client station first attaches to the subsystem 102, an initial client profile is established for that client, with a default storage size estimate. The storage size estimate is updated when the client station actually submits data for storage. However, the passage does not state or fairly suggest the allocation of a storage area (as opposed to a storage size) and capacity utilization thereof, and certainly does not disclose or suggest the allocation of a logical device from a storage pool of unallocated logical devices, as required by Claim 1. Column 7, lines 25-45 similarly describe the adjustment of the storage size estimate, without reference to a defined storage area or logical device.

Furthermore, Claim 1 has been amended to require that, if the capacity of the allocated first logical device is greater than the estimated future capacity utilization

by a determined amount, a second logical device of predetermined capacity is allocated to the computer from the storage pool, and the allocation of the first logical device is released, with the first logical device being returned to the storage pool. This swapping of logical devices is neither disclosed nor suggest by Chellis, Cannon or any motivated combination of these two patents.

In addition, Claim 1 has been amended to recite that if the capacity of the allocated first logical device is greater than or equal to the estimated future capacity utilization but less than the sum of the estimated future capacity utilization plus the determined amount, the allocation of the first logical device to the computer is retained. This condition does not exist in either of the applied patents, and thus the if-then relationship expressed therein is neither disclosed nor suggested by the combination.

Of note among the rejected dependent claims is Claim 10, which requires that the calculating step calculate the estimated future capacity utilization on the basis of the kind of application for utilizing each logical device, access characteristics, or the degree of importance of stored data in addition to the capacity utilization of each logical device. Chellis is applied against this limitation, but only in the broadest of terms (e.g., "for instance Chellis accounts for any application and resource dependencies during allocation"). Respectfully, the application of Chellis's teachings must be directed towards the invention as claimed, and not to broad expressions which may or may not encompass limitations as cited in the claim. In other words, the broad expression of an idea in the prior art does not constitute a positive

teaching to the person of ordinary skill that would render the claimed invention obvious. Similar arguments can be made for the other dependent claims rejected over the combination.

Independent Claim 12-13 have been amended similarly to Claim 1, and the arguments for their patentability follow accordingly.

Dependent Claims 2-3, 5-6 and 8 were rejected under 35 U.S.C. 103(a) as being unpatentable over Chellis and Cannon in view of Cannon et al., U.S. 6,098,074 (Cannon_2).

Chellis and Cannon have been distinguished above. Cannon_2 is cited as teaching that it was widely known to copy allocations to other allocations when adjusting the capacity of a particular allocation, the Office Action citing Column 14, lines 42-63. Although it appears that Column 14, lines 43-63 disclose a "managed file copy" operation involving copying a managed file from one location to another as part of many other operations, such as migration, reclamation, storage pool backup and storage pool restore, the passage cannot be interpreted as foreclosing the patentability of all copying of data (not "allocations") from one storage area or logical device to another, as implied by the rejection. In fact, Cannon_2 does not disclose that, if the capacity of the allocated first logical device is greater than the estimated future capacity utilization by a determined amount, the managing method further comprises the step of copying data stored in the first logical device to the second logical device wherein the copying step is completed before performing the step of releasing the allocation of the first logical device to the computer. In fact, none of the

applied references discloses the swapping of the first logical device for a second logical device, let alone the step of copying data from the first logical device to the second logical device, and completing the copying before releasing the allocation of the first logical device.

With regard to the rejection of dependent Claim 8, the Applicants respectfully submit that the Examiner misinterpreted the expression of the invention. The claim (as originally submitted and as amended) did not recite assigning a 0 as the write I/O number value for archive. Instead, the claim previously recited, "obtaining a value indicating the number of write I/O operations of each storage area allocated to said computer, and ... assigning said storage area having 0 as said write I/O value for archive." As amended, Claim 8 recites the steps of "obtaining a value, indicating the number of write I/O operations of each logical device allocated to said computer, and assigning each logical device having 0 as said write I/O number value for archive." Thus, the number 0 indicates "no write I/O operations", corresponding to no data updates being performed.

Finally, Claim 4 was rejected under 35 U.S.C. 103(a) as being unpatentable over Chellis, Cannon, Cannon_2, and Collins et al., U.S. 6,898,634 (Collins). The Office Action asserts that Collins suggests to reduce the size of a file system in an operation resulting from the combination of Chellis, Cannon, and Cannon_2 without addressing the motivation to combine these references as asserted in the Office Action, the Applicants simply note that Collins does not supply the teachings missing from the other three references, as argued above, and thus the combination of these

four documents cannot be said to lead the person of ordinary skill to the invention defined in Claim 4.

New independent Claim 14 is directed to a managing method supported by, for example, the flow charts shown in Figs. 9 and 10 of the present application. The Applicants refer the Examiner to Pages 20-27 of the specification for examples of support. Dependent Claims 15-17 are also specifically supported by these passages, independent Claims 18-20 are based on other dependent claims examined previously.

In view of the foregoing amendments and remarks, the Applicants request reconsideration of the rejection and allowance of the claims.

Respectfully submitted,



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